Claims:

1. A chemical vapor deposition reactor comprising a rotatable wafer carrier which cooperates with a chamber of the reactor to facilitate laminar flow of reaction gas within the chamber.

2. A chemical vapor deposition reactor comprising a rotatable wafer carrier which is sealed at a periphery thereof to a chamber of the reactor such that laminar flow within the chamber is facilitated.

3. A chemical vapor deposition reactor comprising a chamber and a rotatable wafer carrier disposed within the chamber, the wafer carrier being configured so as to enhance outward flow of reaction gas within the chamber.

4. A chemical vapor deposition reactor comprising a rotatable wafer carrier and a reaction chamber, a bottom of the reaction chamber being substantially defined by the wafer carrier.

5. A chemical vapor deposition reactor comprising a chamber, a wafer carrier disposed within the chamber, and a heater disposed outside of the chamber, the heater being configured to heat the wafer carrier.

6. A chemical vapor deposition reactor comprising a plurality of chambers and at least one of a common reactant gas supply system and a common gas exhaust system.

7. A chemical vapor deposition reactor comprising a wafer carrier configured such that reactant gas does not flow substantially below the wafer carrier.

8. A chemical vapor deposition reactor comprising a chamber, a wafer carrier, a gas inlet located generally centrally within the chamber, and at least one gas outlet formed in the chamber entirely above an upper surface of the wafer carrier so as to enhance laminar gas flow through the chamber.

9. A method for chemical vapor deposition comprising communicating reactant gas through a reactor chamber such that most of the reactants in the reaction gas contact a surface of a wafer prior to exiting the chamber.

10. A method for chemical vapor deposition comprising communicating reaction gas through a reactor chamber via a channel formed intermediate the chamber and a spindle driven wafer carrier, wherein a distance between the chamber and the wafer carrier is small enough to mitigate thermal convection intermediate the chamber and the wafer carrier.

11. A method for chemical vapor deposition comprising effecting generally radial laminar flow within a chamber of a reactor.

12. A method for chemical vapor deposition comprising effecting generally radial laminar flow within a chamber of a reactor, the radial laminar flow being effected, at least partially, by a rotating wafer carrier.

13. A method for chemical vapor deposition comprising effecting, at least partially, generally radial flow of reaction gases within a reactor via centrifugal force.

14. A method for chemical vapor deposition comprising effecting generally radial laminar flow within a chamber of a reactor, the radial laminar flow being effected partially by a gas

inlet disposed generally centrally within the chamber and at least one gas outlet dispose generally peripherally within the chamber and partially by rotation of a wafer carrier.

15. A method for chemical vapor deposition comprising effecting generally radial laminar flow within a reactor by providing reaction gas to a chamber of the reactor via a centrally located reaction gas inlet and by exhausting reaction gas from the chamber via at least one peripherally located reaction gas outlet disposed entirely above an upper surface of a wafer carrier.

16. A method for chemical vapor deposition comprising supplying a plurality of chambers with reactant gases from a common gas supply.

17. A method for chemical vapor deposition comprising removing gas from the chambers via a common gas exhaust system.

18. A method for chemical vapor deposition reactor comprising flowing reactant gas over a wafer carrier without substantially flowing substantially flowing reactant gas below the wafer carrier.

19. A method for chemical vapor deposition reactor comprising flowing reaction gas through a chamber and out of a gas outlet formed in the chamber entirely above an upper surface of a wafer carrier such that laminar gas flow is enhanced.

20. A chemical vapor deposition reactor comprising:

a chamber;

a wafer carrier disposed within the chamber and cooperating with a portion of the chamber to define a flow channel;

a shaft for rotating the wafer carrier; and

wherein a distance between the wafer carrier and the portion of the chamber is small enough to effect generally laminar flow of gas through the flow channel.

21. The chemical vapor deposition reactor as recited in claim 20, wherein the distance between the wafer carrier and the portion of the chamber is small enough for centrifugal force caused by rotation of the wafer carrier to effect outward movement of gas within the channel.

22. The chemical vapor deposition reactor as recited in claim 20, wherein a reaction gas comprises reactants and a distance between the wafer carrier and the portion of the chamber is small enough that a substantial portion of the reactants in the reaction gas contact a surface of a wafer prior to exiting the chamber.

23. The chemical vapor deposition reactor as recited in claim 20, wherein a reaction gas comprises reactants and a distance between the wafer carrier and the portion of the chamber is small enough that most of the reactants in the reaction gas contact a surface of a wafer prior to exiting the chamber.

24. The chemical vapor deposition reactor as recited in claim 20, wherein a distance between the wafer carrier and the portion of the chamber is small enough to mitigate thermal convection intermediate the chamber and the wafer carrier.

25. The chemical vapor deposition reactor as recited in claim 20, wherein a distance between the wafer carrier and the portion of the chamber is less than approximately 2 inch.

26. The chemical vapor deposition reactor as recited in claim 20, wherein a distance between the wafer carrier and the portion of the chamber is between approximately 0.5 inch and approximately 1.5inch.

27. The chemical vapor deposition reactor as recited in claim 20, wherein a distance between the wafer carrier and the portion of the chamber is approximately 0.75 inch.

28. The chemical vapor deposition reactor as recited in claim 20, further comprising a gas inlet formed above the wafer carrier and generally centrally with respect thereto.

29. The chemical vapor deposition reactor as recited in claim 20, wherein the chamber is defined by a cylinder.

30. The chemical vapor deposition reactor as recited in claim 20, wherein the chamber is defined by a cylinder having one generally flat wall thereof defining a top of the chamber and the reaction gas inlet in located at approximately a center of the top of the chamber.

31. The chemical vapor deposition reactor as recited in claim 20, wherein:

the wafer carrier is configured to rotate about an axis thereof; and

the reaction gas inlet is disposed generally coaxially with respect to the axis of the wafer carrier.

32. The chemical vapor deposition reactor as recited in claim 20, wherein the reaction gas inlet has a diameter which is less that 1/5 of a diameter of the chamber.

33. The chemical vapor deposition reactor as recited in claim 20, wherein the reaction gas inlet has a diameter which is less than approximately 2 inches.

34. The chemical vapor deposition reactor as recited in claim 20, wherein the reaction gas inlet has a diameter which is between approximately .25 inch and approximately 1.5 inch.

35. The chemical vapor deposition reactor as recited in claim 20, wherein a reaction gas is constrained to flow generally horizontally within the chamber.

36. The chemical vapor deposition reactor as recited in claim 20, wherein a reaction gas is constrained to flow generally horizontally through the channel.

37. The chemical vapor deposition reactor as recited in claim 20, wherein a reaction gas is caused to flow outwardly at least partially by a rotating wafer carrier.

38. The chemical vapor deposition reactor as recited in claim 20, further comprising at least one reaction gas outlet formed in the chamber above a wafer carrier.

39. The chemical vapor deposition reactor as recited in claim 20, further comprising at least one reaction gas outlet formed in the chamber above a wafer carrier and below a top of the chamber.

40. The chemical vapor deposition reactor as recited in claim 20, further comprising:

a reaction gas inlet formed generally centrally within the chamber;

at least one reaction gas outlet formed in the chamber; and

wherein the wafer carrier is disposed within the chamber below the gas outlet(s) so as to define a flow channel intermediate a top of the chamber and the wafer carrier such that reaction gas flows into the chamber through the reaction gas inlet, through the chamber via the flow channel, and out of the chamber via the reaction gas outlet.

41. The chemical vapor deposition reactor as recited in claim 20, further comprising:

a reaction gas inlet formed generally centrally within the chamber;

at least one reaction gas outlet formed in the chamber;

a ring diffuser disposed proximate a periphery of the wafer carrier and configured so as to enhance laminar flow from the reaction gas inlet to the reaction gas outlet(s); and

wherein the wafer carrier is disposed within the chamber below the gas outlets so as to define a flow channel intermediate a top of the chamber and the wafer carrier such that reaction gas flows into the chamber through the reaction gas inlet, through the chamber via the flow channel, and out of the chamber via the reaction gas outlet.

42. The chemical vapor deposition reactor as recited in claim 20, further comprising:

a reaction gas inlet formed generally centrally within the chamber;

a plurality of reaction gas outlets formed in the chamber;

a ring diffuser disposed proximate a periphery of the wafer carrier and configured so as to enhance laminar flow from the reaction gas inlet to the reaction gas outlet, the ring diffuser comprising:

a substantially hollow annulus having an inner surface and an outer surface;

a plurality of openings formed in the inner surface;

a plurality of openings form in the outer surface; and

wherein openings in the inner surface enhance uniformity of reaction gas flow over the wafer carrier; and

wherein the wafer carrier is disposed within the chamber below the gas outlets so as to define a flow channel intermediate a top of the chamber and the wafer carrier such that reaction gas flows into the chamber through the reaction gas inlet, through the chamber via the flow channel, and out of the chamber via the reaction gas outlet.

43. The chemical vapor deposition reactor as recited in claim 20, further comprising:

a reaction gas inlet formed generally centrally within the chamber;

a plurality of reaction gas outlets formed in the chamber above a wafer carrier;

a ring diffuser disposed proximate a periphery of the wafer carrier and configured so as to enhance laminar flow from the reaction gas inlet to the reaction gas outlet, the ring diffuser comprising:

a substantially hollow annulus having an inner surface and an outer surface;

a plurality of openings formed in the inner surface;

a plurality of openings form in the outer surface;

wherein the openings in the inner surface are configured so as to create enough restriction to reaction gas flow therethrough so as to enhance a uniformity of reaction gas flow over the wafer carrier; and

wherein the wafer carrier is disposed within the chamber below the gas outlets so as to define a flow channel intermediate a top of the chamber and the wafer carrier such that reaction gas flows into the chamber through the reaction gas inlet, through the chamber via the flow channel, and out of the chamber via the reaction gas outlet.

44. The chemical vapor deposition reactor as recited in claim 20, further comprising:

a reaction gas inlet formed generally centrally within the chamber;

a plurality of reaction gas outlets formed in the chamber above a wafer carrier;

a ring diffuser disposed proximate a periphery of the wafer carrier and configured so as to enhance laminar flow from the reaction gas inlet to the reaction gas outlet, the ring diffuser being comprised of a material which is resistant to deterioration caused by heated ammonia; and

wherein the wafer carrier is disposed within the chamber below the gas outlets so as to define a flow channel intermediate a top of the chamber and the wafer carrier such that reaction gas flows into the chamber through the reaction gas inlet, through the chamber via the flow channel, and out of the chamber via the reaction gas outlet.

45. The chemical vapor deposition reactor as recited in claim 20, further comprising:

a reaction gas inlet formed generally centrally within the chamber;

a plurality of reaction gas outlets formed in the chamber above a wafer carrier;

a ring diffuser disposed proximate a periphery of the wafer carrier and configured so as to enhance laminar flow from the reaction gas inlet to the reaction gas outlet, the ring diffuser being comprised of at least one of graphite, SiC coated graphite, SiC quartz, or molybdenum; and

wherein the wafer carrier is disposed within the chamber below the gas outlets so as to define a flow channel intermediate a top of the chamber and the wafer carrier such that reaction gas flows into the chamber through the reaction gas inlet, through the chamber via the flow channel, and out of the chamber via the reaction gas outlet.

46. The chemical vapor deposition reactor as recited in claim 20, further comprising a seal disposed intermediate the wafer carrier and the chamber, the seal being configured to mitigate reaction gas flow out of the chamber other than from the reaction gas outlet.

47. The chemical vapor deposition reactor as recited in claim 20, further comprising a ring seal disposed intermediate the wafer carrier and the chamber, the ring seal being configured to mitigate reaction gas flow out of the chamber other than from the reaction gas outlet.

48. The chemical vapor deposition reactor as recited in claim 20, further comprising a ring seal disposed intermediate the wafer carrier and the chamber, the ring seal being configured to mitigate reaction gas flow out of the chamber other than from the reaction gas outlet, the ring seal comprising at least one of graphite, quartz, and SiC.

49. The chemical vapor deposition reactor as recited in claim 20, further comprising a heater assembly disposed outside of the chamber and proximate the wafer carrier.

50. The chemical vapor deposition reactor as recited in claim 20, further comprising an induction heater assembly disposed outside of the chamber and proximate the wafer carrier.

51. The chemical vapor deposition reactor as recited in claim 20, further comprising a radiant heater assembly disposed outside of the chamber and proximate the wafer carrier.

52. The chemical vapor deposition reactor as recited in claim 20, further comprising: a heater assembly disposed outside of the chamber and proximate the wafer carrier; and

a heater purge system configured to mitigate contact of reaction gas with the heater.

53. The chemical vapor deposition reactor as recited in claim 20, further comprising a gas flow controller configured to control the amount of reactant gases introduced into the chamber via the gas inlet port.

54. The chemical vapor deposition reactor as recited in claim 20, further comprising:

a carrier gas inlet in fluid communication with the reaction gas inlet;

an alkyl inlet in fluid communication with the carrier gas inlet; and

an ammonia inlet in fluid communication with the carrier gas inlet.

55. The chemical vapor deposition reactor as recited in claim 20, further comprising:

a carrier gas inlet in fluid communication with the reaction gas inlet;

an alkyl inlet in fluid communication with the carrier gas inlet;

an ammonia inlet in fluid communication with the carrier gas inlet; and

wherein the alkyl inlet and the ammonia inlet are disposed proximate the chamber so as enhance separation of alkyls and ammonia prior to introduction thereof into the chamber.

56. The chemical vapor deposition reactor as recited in claim 20, further comprising:

an alkyl inlet in fluid communication with the reaction gas inlet;

an ammonia conduit which passes through the reaction gas inlet; and

wherein ammonia conduit is configured to maintain separation of alkyls and ammonia prior to introduction thereof into the chamber.

57. The chemical vapor deposition reactor as recited in claim 20, further comprising:

an alkyl inlet in fluid communication with the reaction gas inlet;

an ammonia conduit which passes through the reaction gas inlet so as to define an inner ammonia fluid conduit and an outer alkyl fluid conduit; and

wherein the inner ammonia conduit and the outer alkyl conduit are configured to maintain separation of alkyls and ammonia prior to introduction thereof into the chamber.

58. The chemical vapor deposition reactor as recited in claim 20, further comprising:

an ammonia inlet in fluid communication with the reaction gas inlet;

an alkyl conduit which passes through the reaction gas inlet so as to define an inner alkyl fluid conduit and an outer ammonia fluid conduit; and

wherein the inner alkyl conduit and the outer ammonia conduit are configured to maintain separation of alkyls and ammonia prior to introduction thereof into the chamber.

59. The chemical vapor deposition reactor as recited in claim 20, further comprising:

an outer tube in fluid communication with the reaction gas inlet;

an inner tube disposed at least partially within the outer tube and in fluid communication with the reaction gas inlet; and

wherein the outer tube and the inner tube are configured so as to enhance separation of alkyls and ammonia prior to introduction thereof into the chamber.

60. The chemical vapor deposition reactor as recited in claim 20, further comprising:

an outer tube in fluid communication with the reaction gas inlet;

an inner tube disposed at least partially within the outer tube and in fluid communication with the reaction gas inlet; and

wherein the outer tube and the inner tube are configured generally concentrically with respect to one another, so as to enhance separation of alkyls and ammonia prior to introduction thereof into the chamber and so as to enhance mixing of the alkyls and ammonia subsequent to introduction thereof into the chamber.

61. The chemical vapor deposition reactor as recited in claim 20, wherein:

the wafer carrier is configured to support at least three 2 inch round wafers; and

further comprising a plurality of gas inlets, each gas inlet being configured so as to generally provide reaction gases to a different portion of the wafer carrier.

62. The chemical vapor deposition reactor as recited in claim 20, wherein:

the wafer carrier configured to support at least three 2 inch round wafers;

further comprising a plurality of gas inlets, each gas inlet being configured so as to generally provide reaction gases to a different portion of the wafer carrier; and

a gas flow controller configured to control the amount of reactant gases introduce into the chamber via each gas inlet port.

63. A method for chemical vapor deposition, the method comprising:

providing a chamber containing a wafer carrier;

rotating the wafer carrier with a spindle;

effecting generally laminar flow of gas intermediate a portion of the chamber and the wafer carrier.

64. The method as recited in claim 63, wherein a distance between the wafer carrier and the portion of the chamber is small enough for centrifugal force caused by rotation of the wafer carrier to effect outward movement of gas within the channel.

65. The method as recited in claim 63, wherein a reaction gas comprises reactants and a distance between the wafer carrier and the portion of the chamber is small enough that a substantial portion of the reactants in the reaction gas contact a surface of a wafer prior to exiting the chamber.

66. The method as recited in claim 63, wherein a reaction gas comprises reactants and a distance between the wafer carrier and the portion of the chamber is small enough that most of the reactants in the reaction gas contact a surface of a wafer prior to exiting the chamber.

67. The method as recited in claim 63, wherein a distance between the wafer carrier and the portion of the chamber is small enough to mitigate thermal convection intermediate the chamber and the wafer carrier.

68. The method as recited in claim 63, wherein the distance between the wafer carrier and the portion of the chamber is less than approximately 2 inch.

69. The method as recited in claim 63, wherein the distance between the wafer carrier and the portion of the chamber is between approximately 0.5 inch and approximately 1.5 inch.

70. The method as recited in claim 63, wherein the distance between the wafer carrier and the portion of the chamber is approximately 0.75 inch.

71. The method as recited in claim 63, further comprising a gas inlet formed above the wafer carrier and generally centrally with respect thereto.

72. The method as recited in claim 63, wherein the chamber is defined by a cylinder.

73. The method as recited in claim 63, wherein the chamber is defined by a cylinder having one generally flat wall thereof defining a top of the chamber and a reaction gas inlet is formed at approximately a center of the top of the chamber.

74. The method as recited in claim 63, further comprising introducing gas into the chamber via a reaction gas inlet is disposed generally coaxially with respect to axis of the wafer carrier.

75. The method as recited in claim 63, wherein reaction gas is introduced into the chamber via a gas inlet which has a diameter which is less that 1/5 of a diameter of the chamber.

76. The method as recited in claim 63, wherein reaction gas is introduced into the chamber via a gas inlet which has a diameter which is less than approximately 2 inches.

77. The method as recited in claim 63, wherein reaction gas is introduced into the chamber via a gas inlet which has a diameter which is between approximately .25 inch and approximately 1.5 inch.

78. The method as recited in claim 63, wherein a reaction gas is constrained to flow generally horizontally.

79. The method as recited in claim 63, wherein a reaction gas is constrained to flow generally horizontally through a channel defined by cooperation of the chamber and a wafer carrier.

80. The method as recited in claim 63, wherein a reaction gas is caused to flow outwardly at least partially by a rotating wafer carrier.

81. The method as recited in claim 63, wherein at least one reaction gas flows out of the chamber via an outlet formed in the chamber above a wafer carrier.

82. The method as recited in claim 63, wherein at least one reaction gas outlet is formed in the chamber above a wafer carrier and below a top of the chamber.

83. The method as recited in claim 63, wherein:

a reaction gas inlet is formed generally centrally in the chamber;

at least one reaction gas outlet is formed in the chamber; and

the wafer carrier is disposed within the chamber below the gas outlet(s) so as to define a flow channel intermediate a top of the chamber and the wafer carrier such that reaction gas flows into the chamber through the reaction gas inlet, through the chamber via the flow channel, and out of the chamber via the reaction gas outlet.

84. The method as recited in claim 63, wherein:

a reaction gas inlet is formed generally centrally in the chamber;

a plurality of reaction gas outlets are formed in the chamber;

the wafer carrier is disposed within the chamber below the gas outlets so as to define a flow channel intermediate a top of the chamber and the wafer carrier such that reaction gas flows into the chamber through the reaction gas inlet, through the chamber via the flow channel, and out of the chamber via the reaction gas outlet; and

a ring diffuser disposed proximate a periphery of the wafer carrier enhances laminar flow from the reaction gas inlet to the reaction gas outlet.

85. The method as recited in claim 63, wherein:

a reaction gas inlet is formed generally centrally in the chamber;

a plurality of reaction gas outlets are formed in the chamber;

the wafer carrier is disposed within the chamber below the gas outlets so as to define a flow channel intermediate a top of the chamber and the wafer carrier such that reaction gas flows into the chamber through the reaction gas inlet, through the chamber via the flow channel, and out of the chamber via the reaction gas outlet;

a ring diffuser disposed proximate a periphery of the wafer carrier enhances laminar flow from the reaction gas inlet to the reaction gas outlet, the ring diffuser comprising:

a substantially hollow annulus having an inner surface and an outer surface;

a plurality of openings formed in the inner surface;

a plurality of openings form in the outer surface; and

wherein openings in the inner surface enhance uniformity of reaction gas flow over the wafer carrier.

86. The method as recited in claim 63, wherein:

a reaction gas inlet is formed generally centrally in the chamber;

a plurality of reaction gas outlets are formed in the chamber above a wafer carrier;

the wafer carrier is disposed within the chamber so as to define a flow channel intermediate a top of the chamber and the wafer carrier such that reaction gas flows into the chamber through the reaction gas inlet, through the chamber via the flow channel, and out of the chamber via the reaction gas outlet;

a ring diffuser disposed proximate a periphery of the wafer carrier enhances laminar flow from the reaction gas inlet to the reaction gas outlet, the ring diffuser comprising:

a substantially hollow annulus having an inner surface and an outer surface;

a plurality of openings formed in the inner surface;

a plurality of openings form in the outer surface; and

wherein the openings in the inner surface are configured so as to create enough restriction to reaction gas flow therethrough so as to enhance a uniformity of reaction gas flow over the wafer carrier.

87. The method as recited in claim 63, wherein:

a reaction gas inlet is formed generally centrally in the chamber;

a plurality of reaction gas outlets are formed in the chamber above a wafer carrier;

the wafer carrier is disposed within the chamber so as to define a flow channel intermediate a top of the chamber and the wafer carrier such that reaction gas flows into the chamber through the reaction gas inlet, through the chamber via the flow channel, and out of the chamber via the reaction gas outlet; and

a ring diffuser disposed proximate a periphery of the wafer carrier enhances laminar flow from the reaction gas inlet to the reaction gas outlet, the ring diffuser being comprised of a material which is resistant to deterioration caused by heated ammonia.

88. The method as recited in claim 63, wherein:

a reaction gas inlet is formed generally centrally in the chamber;

a plurality of reaction gas outlets are formed in the chamber above a wafer carrier;

the wafer carrier is disposed within the chamber so as to define a flow channel intermediate a top of the chamber and the wafer carrier such that reaction gas flows into the chamber through the reaction gas inlet, through the chamber via the flow channel, and out of the chamber via the reaction gas outlet; and

a ring diffuser disposed proximate a periphery of the wafer carrier enhances laminar flow from the reaction gas inlet to the reaction gas outlet, the ring diffuser being comprised of at least one of graphite, SiC coated graphite, SiC quartz, or molybdenum.

89. The method as recited in claim 63, further comprising:

supporting a plurality of wafers via the wafer carrier; and

mitigating reaction gas flow out of the chamber, other than from the reaction gas outlet, via a seal disposed intermediate the wafer carrier and the chamber

90. The method as recited in claim 63, further comprising:

supporting a plurality of wafers via the wafer carrier; and

mitigating reaction gas flow out of the chamber, other than from the reaction gas outlet, via a ring seal disposed intermediate the wafer carrier and the chamber.

91. The method as recited in claim 63, further comprising:

supporting a plurality of wafers via the wafer carrier; and

mitigating reaction gas flow out of the chamber, other than from the reaction gas outlet, via a ring seal disposed intermediate the wafer carrier and the chamber, the ring seal being configured, the ring seal comprising at least one of graphite, quartz, and SiC.

92. The method as recited in claim 63, further comprising heating at least one wafer disposed within the chamber via a heater assembly disposed outside of the chamber and proximate the wafer carrier.

93. The method as recited in claim 63, further comprising heating at least one wafer disposed within the chamber via an induction heater assembly disposed outside of the chamber and proximate the wafer carrier.

94. The method as recited in claim 63, further comprising heating at least one wafer disposed within the chamber via a radiant heater assembly disposed outside of the chamber and proximate the wafer carrier.

95. The method as recited in claim 63, further comprising:

heating at least one wafer disposed within the chamber via a heater assembly disposed outside of the chamber and proximate the wafer carrier; and

mitigating contact of reaction gas with the heater via a heater purge system.

96. The method as recited in claim 63, further comprising controlling an amount of reactant gases introduced into the chamber via a gas flow controller.

97. The method as recited in claim 63, further comprising:

providing a carrier gas to the chamber via a carrier gas inlet in fluid communication with the reaction gas inlet;

providing an alkyl to the chamber via an alkyl inlet in fluid communication with the carrier gas inlet; and

providing ammonia to the chamber via an ammonia inlet in fluid communication with the carrier gas inlet.

98. The method as recited in claim 63, further comprising:

providing a carrier gas to the chamber via a carrier gas inlet in fluid communication with the reaction gas inlet;

providing an alkyl to the chamber via an alkyl inlet in fluid communication with the carrier gas inlet;

providing ammonia to the chamber via an ammonia inlet in fluid communication with the carrier gas inlet; and

wherein the alkyl inlet and the ammonia inlet are disposed proximate the chamber so as enhance separation of alkyls and ammonia prior to introduction thereof into the chamber.

99. The method as recited in claim 63, further comprising:

providing an alkyl to the chamber via an alkyl conduit in fluid communication with the reaction gas inlet;

providing ammonia to the chamber via an ammonia conduit which passes through the reaction gas inlet; and

wherein ammonia conduit is configured to maintain separation of alkyls and ammonia prior to introduction thereof into the chamber.

100. The method as recited in claim 63, further comprising:

providing an alkyl to the chamber via an alkyl conduit in fluid communication with the reaction gas inlet;

providing ammonia to the chamber via an ammonia conduit which passes through the reaction gas inlet; and

wherein the inner ammonia conduit and the outer alkyl conduit are configured to maintain separation of alkyls and ammonia prior to introduction thereof into the chamber.

101. The method as recited in claim 63, further comprising:

providing an alkyl to the chamber via an alkyl conduit in fluid communication with the reaction gas inlet;

providing ammonia to the chamber via an ammonia conduit which passes through the reaction gas inlet; and

wherein the inner alkyl conduit and the outer ammonia conduit are configured to maintain separation of alkyls and ammonia prior to introduction thereof into the chamber.

102. The method as recited in claim 63, further comprising:

providing a first gas to the chamber via an outer;

providing a second gas to the chamber via an inner tube disposed at least partially within the outer; and

wherein the outer tube and the inner tube are configured so as to enhance separation of first and second gases prior to introduction thereof into the chamber.

103. The method as recited in claim 63, further comprising:

providing a first gas to the chamber via an outer;

providing a second gas to the chamber via an inner tube disposed at least partially within the outer; and

wherein the outer tube and the inner tube are configured generally concentrically with respect to one another, so as to enhance separation of alkyls and ammonia prior to introduction thereof into the chamber and so as to enhance mixing of the alkyls and ammonia subsequent to introduction thereof into the chamber.

104. A chemical vapor deposition reactor comprising:

a chamber; and

a wafer carrier disposed within the chamber, the wafer carrier being configured so as to facilitate outward flow of reaction gas due to centrifugal force.

105. The chemical vapor deposition reactor as recited in claim 104, wherein the wafer carrier comprises a rotating wafer carrier.

106. The chemical vapor deposition reactor as recited in claim 104, wherein the wafer carrier is configured to preferably rotate at greater than approximately 500 rpm.

107. The chemical vapor deposition reactor as recited in claim 104, wherein the wafer carrier is configured to rotate at between approximately 100 rpm and approximately 1500 rpm.

108. The chemical vapor deposition reactor as recited in claim 104, wherein the wafer carrier is configured to rotate at approximately 800 rpm.

109. The chemical vapor deposition reactor as recited in claim 104, wherein a gas supply is configured so as to maintain the reaction gases separate from one another until the gases are inside of the chamber.

110. The chemical vapor deposition reactor as recited in claim 104, further comprising:

a outer fluid conduit configured to provide at least one reaction gas to the chamber;

at least one inner fluid conduit disposed within the outer fluid conduit and configured to provide at least one other reaction gas to the chamber; and

wherein the inner and outer fluid conduit facilitate separation of the reaction gases.

111. The chemical vapor deposition reactor as recited in claim 104, further comprising:

a outer fluid conduit configured to provide at least one reaction gas to the chamber;

at least one inner fluid conduit disposed concentrically within the outer fluid conduit and configured to provide at least one other reaction gas to the chamber; and

wherein the inner and outer fluid conduit facilitate separation of the reaction gases.

112. A method for chemical vapor deposition, the method comprising:

providing a reaction chamber;

providing a wafer carrier disposed within the chamber;

rotating the wafer carrier being so as to facilitate outward flow of reaction gas due to centrifugal force.

113. The method as recited in claim 112, wherein rotating the wafer carrier comprises rotating the wafer carrier at greater than approximately 500 rpm.

114. The method as recited in claim 112, wherein rotating the wafer carrier comprises rotating the wafer carrier at between approximately 100 rpm and approximately 1500 rpm.

115. The method as recited in claim 112, wherein rotating the wafer carrier comprises rotating the wafer carrier at approximately 800 rpm.

116. The method as recited in claim 112, wherein reaction gases are maintained separate from on another until the gases are inside of the chamber.

117. The method as recited in claim 112, further comprising:

communicating a first reaction gas via an outer fluid conduit to the chamber;

communicating a second reaction gas via at least one inner fluid conduit disposed within the outer fluid conduit to the chamber; and

wherein the inner and outer fluid conduits facilitate separation of the reaction gases.

118. The method as recited in claim 112, further comprising:

communicating a first reaction gas via a outer fluid conduit to the chamber;

communicating a second reaction gas via at least one inner fluid conduit disposed within the outer fluid conduit to the chamber; and

wherein the inner and outer fluid conduits are generally concentric with respect to one another and facilitate separation of the reaction gases.

119. A chemical vapor deposition reactor comprising:

a reactor chamber configured to contain at least one wafer; and

a heater disposed outside of the chamber and configured so as to heat the wafer(s).

120. The chemical vapor deposition reactor as recited in claim119, further comprising a wafer carrier configured to support at least one wafer.

121. The chemical vapor deposition reactor as recited in claim 119, further comprising a wafer carrier configured to rotate within the chamber and to support a plurality of wafers.

122. The chemical vapor deposition reactor as recited in claim 119, further comprising a wafer carrier which defines bottom of the chamber and which is configured to rotate within the chamber and to support a plurality of wafers.

123. The chemical vapor deposition reactor as recited in claim 119, further comprising: a wafer carrier which defines a bottom of the chamber and which is configured to rotate within the chamber and to support a plurality of wafers; and

a ring seal configured so as to mitigate a flow of gas between the wafer carrier and a side portion of the chamber.

124. A method for chemical vapor deposition, the method comprising:

providing a reactor chamber contain at least one wafer; and

heating the wafer(s) via a heater disposed outside of the chamber.

125. The method as recited in claim 124, further comprising supporting the wafer(s) with a wafer carrier.

126. The method as recited in claim 124, further comprising rotating a wafer carrier within the chamber.

127. The method as recited in claim 124, further comprising defining a bottom of the chamber with a wafer carrier which is configured to rotate within the chamber and to support a plurality of wafers.

128. The method as recited in claim 124, further comprising:

defining a bottom of the chamber with a wafer carrier which is configured to rotate within the chamber and to support a plurality of wafers; and

mitigating a flow of gas between the wafer carrier and a side portion of the chamber with a ring seal.

129. A chemical vapor deposition system comprising;

a plurality of reactor chambers;

a common gas supply system configured so as to provide reaction gases to the chambers; and

a common gas exhaust system configured so as to remove gases from the chambers.

130. The chemical vapor deposition system as recited in claim 129, further comprising a wafer carrier disposed within each chamber, the wafer carriers being configured so as to support less than twelve wafers each.

131. A method for chemical vapor deposition, the method comprising;

providing a plurality of reactor chambers;

providing reaction gases to the chambers via a common gas supply; and

removing gases from the chambers via a common gas exhaust system.

132. The method as recited in claim 131, further comprising supporting less than twelve wafers upon a wafer carrier disposed within each chamber.

133. A wafer made by a method for chemical vapor deposition comprising communicating reaction gas through a reactor chamber such that most of the reactants in the reaction gas contact a surface of a wafer prior to exiting the chamber.

134. A wafer made by a method for chemical vapor deposition comprising communicating reaction gas through a reactor chamber via a channel formed intermediate the chamber and a wafer carrier, wherein a distance between the chamber and the wafer carrier is small enough to mitigate thermal convection intermediate the chamber and the wafer carrier.

135. A wafer made by a method for chemical vapor deposition comprising effecting generally radial laminar flow within a chamber of a reactor.

136. A wafer made by a method for chemical vapor deposition comprising effecting generally radial laminar flow within a chamber of a reactor, the radial laminar flow being effected, at least partially, by a gas inlet disposed generally centrally within the chamber and by at least one gas outlet dispose generally peripherally within the chamber.

137. A wafer made by a method for chemical vapor deposition comprising effecting generally radial laminar flow within a chamber of a reactor, the radial laminar flow being effected, at least partially, by a rotating wafer carrier.

138. A wafer made by a method for chemical vapor deposition comprising effecting, at least partially, generally radial flow of reaction gases within a reactor via centrifugal force.

139. A wafer made by a method for chemical vapor deposition comprising effecting generally radial laminar flow within a reactor by providing reaction gas to a chamber of the reactor via a centrally located reaction gas inlet and by exhausting reaction gas from the chamber via at least one peripherally located reaction gas outlet.

140. A wafer made by a method for chemical vapor deposition comprising maintaining at least two reactant gases generally separate with respect to one another and introducing the gases into a chamber in a manner that generally mixes the gases and provides a generally radial flow thereof.

141. A wafer made by a method for chemical vapor deposition comprising heating at least one wafer which is disposed within a reactor chamber with at least one heater which is disposed outside of the reactor chamber.

142. A die made by a method for chemical vapor deposition comprising communicating reaction gas through a reactor chamber such that most of the reactants in the reaction gas contacts a surface of a wafer prior to exiting the chamber.

143. A die made by a method for chemical vapor deposition comprising communicating reaction gas through a reactor chamber via a channel formed intermediate the chamber and a wafer carrier, wherein a distance between the chamber and the wafer carrier is small enough to mitigate thermal convection intermediate the chamber and the wafer carrier.

144. A die made by a method for chemical vapor deposition comprising effecting generally radial laminar flow within a chamber of a reactor.

145. A die made by a method for chemical vapor deposition comprising effecting generally radial laminar flow within a chamber of a reactor, the radial laminar flow being effected, at least partially, by a gas inlet disposed generally centrally within the chamber and by at least one gas outlet dispose generally peripherally within the chamber.

146. A die made by a method for chemical vapor deposition comprising effecting generally radial laminar flow within a chamber of a reactor, the radial laminar flow being effected, at least partially, by a rotating wafer carrier.

147. A die made by a method for chemical vapor deposition comprising effecting, at least partially, generally radial flow of reaction gases within a reactor via centrifugal force.

148. A die made by a method for chemical vapor deposition comprising effecting generally radial laminar flow within a reactor by providing reaction gas to a chamber of the reactor via a centrally located reaction gas inlet and by exhausting reaction gas from the chamber via at least one peripherally located reaction gas outlet.

149. A die made by a method for chemical vapor deposition comprising maintaining at least two reactant gases generally separate with respect to one another and introducing the gases into a chamber in a manner that generally mixes the gases and provides a generally radial flow thereof.

150. A die made by a method for chemical vapor deposition comprising heating at least one wafer which is disposed within a reactor chamber with at least one heater which is disposed outside of the reactor chamber.

151. An LED made by a method for chemical vapor deposition comprising communicating reaction gas through a reactor chamber such that most of the reactants in the reaction gas contact a surface of a wafer prior to exiting the chamber.

152. An LED made by method for chemical vapor deposition comprising communicating reaction gas through a reactor chamber via a channel formed intermediate the chamber and a wafer carrier, wherein a distance between the chamber and the wafer carrier is small enough to mitigate thermal convection intermediate the chamber and the wafer carrier.

153. An LED made by method for chemical vapor deposition comprising effecting generally radial laminar flow within a chamber of a reactor.

154. An LED made by method for chemical vapor deposition comprising effecting generally radial laminar flow within a chamber of a reactor, the radial laminar flow being effected, at least partially, by a gas inlet disposed generally centrally within the chamber and by at least one gas outlet dispose generally peripherally within the chamber.

155. An LED made by method for chemical vapor deposition comprising effecting generally radial laminar flow within a chamber of a reactor, the radial laminar flow being effected, at least partially, by a rotating wafer carrier.

156. An LED made by method for chemical vapor deposition comprising effecting, at least partially, generally radial flow of reaction gases within a reactor via centrifugal force.

157. An LED made by method for chemical vapor deposition comprising effecting generally radial laminar flow within a reactor by providing reaction gas to a chamber of the

reactor via a centrally located reaction gas inlet and by exhausting reaction gas from the chamber via at least one peripherally located reaction gas outlet.

158. An LED made by method for chemical vapor deposition comprising maintaining at least two reactant gases generally separate with respect to one another and introducing the gases into a chamber in a manner that generally mixes the gases and provides a generally radial flow thereof.

159. An LED made by method for chemical vapor deposition comprising heating at least one wafer which is disposed within a reactor chamber with at least one heater which is disposed outside of the reactor chamber.

160. A method for chemical vapor deposition comprising heating at least one wafer which is disposed within a reactor chamber with at least one heater which is disposed outside of the reactor chamber.